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U. S. DEPARTMENT OF AGRICULTURE,

FOREST SERVICE—Circular 44.

GIFFORD PINCHOT, Forester.

WOOD USED FOR PULP IN 1905.

By

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LETTER OF TRANSMITTAL.

U. S. Department of Agriculture,
Forest Service,
Washington, D. C., September 22, 1906.

Sir: I have the honor to transmit herewith a manuscript entitled "Wood Used for Pulp in 1905," prepared by H. M. Hale, Forest Assistant, Forest Service, from reports received from manufacturers of pulp, and to recommend its publication as Circular 44 of the Forest Service.

Very respectfully,

Gifford Pinchot,
Forester.

Hon. James Wilson,
Secretary of Agriculture.

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WOOD USED FOR PULP IN 1905.

INTRODUCTION.

The following tables of the quantity and value of wood used for pulp are compiled from reports made direct to the Forest Service by wood-pulp manufacturers. Acknowledgment is made to these manufacturers for their cordial and efficient cooperation. The number who neglected to report is less than 5 per cent.

The amount of wood used for pulp is small in comparison to the total lumber production, being about 4 per cent of the annual production of lumber, and 3 per cent of the value. Yet the wood-pulp industry is of much importance and has developed rapidly. According to the census of 1900 there was during the decade 1890–1900 an increase of more than 17 per cent in the number of establishments and of more than 86 per cent in the capital invested. The figures apply to pulp and paper mills combined, but it is safe to assume that the ratio of increase holds good if applied to pulp mills alone. A preliminary bulletin recently issued by the Bureau of the Census shows that from 1899 to 1904 there was no increase in the number of establishments, but that the capital invested increased 66 per cent during that time.

TABLE I.—*Wood used and pulp produced in 1905.*

State.	Companies.	Wood used.		Pulp produced.
		Amount.	Value.	
	Number.	*Cords.*		*1,000 pounds.*
New York	60	1,301,986	$8,137,412	1,954,626
Maine	18	501,807	2,950,625	646,024
Wisconsin	30	382,471	1,686,697	481,314
New Hampshire	6	233,700	1,257,306	257,795
Pennsylvania	11	250,826	1,158,816	246,744
Michigan	8	109,764	475,278	126,551
West Virginia	4	96,357	497,202	99,713
Virginia	3	89,540	492,470	89,299
Ohio	3	54,000	274,320	58,100
Minnesota	3	31,802	121,801	49,484
Vermont	7	22,271	122,490	40,415
Massachusetts	4	34,362	171,810	33,989
All other[a]	7	83,337	389,438	84,910
Total	[b]164	3,192,223	17,735,665	4,168,964

[a] One mill each in Delaware, Maryland, Washington, California, Colorado, Texas, South Carolina.
[b] Operating 237 mills.

WOOD USED.

AMOUNT AND VALUE.

A review of the statistics of the pulp industry as given by the reports of the Bureau of the Census for the years 1899 and 1904 shows an increase of 53.3 per cent in the amount of wood used, the exact

figures being 1,986,310 cords in 1899, and 3,043,459 cords in 1904. In the present report the amount of wood used in 1905 as compared with 1904 shows an increase of 4.6 per cent. The totals given in Table I show that 164 companies operating 237 mills used 3,192,223 cords of wood in 1905, which produced 4,168,964,000 pounds, or 2,084,482 tons of pulp. Statements by manufacturers indicate that the average amount of pulp produced from a cord of wood by the various processes is as follows: Mechanical 2,372 pounds, soda 1,033 pounds, and sulfite 1,009 pounds. The estimate of the quantity of pulp is not wholly satisfactory, since some companies reported dry pulp and others reported pulp containing various amounts of water. Averaging all processes the figures given show a production of 1,300 pounds of pulp per cord of wood.

It has been found impossible to make an accurate comparison of the number of establishments using pulp wood in 1904 and 1905, because the reports of the Bureau of the Census do not differentiate between pulp mills and paper mills. The total number of mills engaged in the manufacture of pulp or paper, or both, in 1904 was 759. In 1905 the number of mills engaged in the manufacture of both pulp and paper was 117, and the number engaged in the manufacture of pulp alone was 120, making the total number of mills manufacturing pulp 237.

SPECIES AND PROCESSES.

Spruce is the wood most used for pulp, furnishing more than 70 per cent of the total amount. Table II gives statistics of species and processes. The processes, broadly speaking, are two—mechanical and chemical. There are, however, two chemical processes, sulfite and soda, so called because they use sulfurous acid and caustic soda, respectively, in reducing the wood.

TABLE II.—*Kinds and amounts of wood manufactured into pulp by various processes.*

Kind.	Process.				
	Mechanical.	Sulfite.	Soda.	Total.	Per cent.
Spruce:	*Cords.*	*Cords.*	*Cords.*	*Cords.*	
Domestic	794,260	784,674	71,775	1,650,709	
Imported	230,289	392,256	.....	622,545	
	1,024,549	1,176,930	71,775	2,273,254	71.2
Poplar:					
Domestic	8,592	.....	290,583	299,175	
Imported	2,800	.....	20,083	22,883	
	11,392	.....	310,666	322,058	10.1
Hemlock	30,843	344,579	.....	375,422	11.8
Pine	14,432	18,600	24,367	57,399	1.8
Balsam	10,801	45,943	.....	56,744	1.8
Cottonwood	.....	.....	10,507	10,507	.3
All other	4,777	44,341	47,621	96,739	3.0
	1,096,794	1,630,393	464,936	3,192,222	100.0

The greater portion of the spruce is reduced by the sulfite process. Cottonwood and poplar are reduced almost entirely by the

soda process. Next to spruce and poplar, hemlock is most used. It has sprung into favor in a comparatively short time, and is reduced chiefly by the sulfite process. Pine is reduced by all processes. Balsam, a wood scarcely considered for pulp in 1899, is now widely used, mainly in conjunction with spruce. While it furnishes less than 2 per cent of the total amount of wood used for pulp, it is practically as important as pine and would furnish a much larger quantity were it not for the limited supply.

The totals for all processes show that more wood was reduced by the sulfite process in 1905 than by all other processes combined. The respective proportions are: Sulfite, 51 per cent; mechanical, 34 per cent; soda, 15 per cent.

TABLE III.—*Comparison of total amounts of wood used for pulp in 1899 and 1905.*

Process.	1899.	1905.	Increase.	
	Cords.	*Cords.*	*Cords.*	*Per cent.*
Mechanical	786,840	1,096,804	309,964	39.4
Chemical	1,199,470	2,095,419	895,949	74.7
Total	1,986,310	3,192,223	1,205,913	60.7

Table III compares the amount of wood used for pulp in 1899, as given by the Twelfth Census, with the amount reported to the Forest Service for 1905. This shows that during these six years there was an increase of 60.7 per cent in the total amount of wood used. The rate of increase was much greater with the chemical process, as there was a gain of 74.7 per cent in the amount of wood used for chemical reduction, against an increase of 39.4 per cent in the quantity of wood used for mechanical reduction.

IMPORTED WOOD.

The increasing demand for spruce has made a consequent demand by American manufacturers upon the Canadian spruce forests. This is strikingly shown in Table IV, which indicates that the importations have increased about 75 per cent in the last six years, while spruce, which constitutes the bulk of the imported woods, increased 83 per cent.

TABLE IV.—*Comparison of wood imported from Canada for pulp in 1899 and 1905.*

Kind.	1899.	1905.	Increase.	
	Cords.	*Cords.*	*Cords.*	*Per cent.*
Spruce	349,084	622,545	293,461	82.9
Poplar	20,133	22,883	2,750	13.6
Total	369,217	645,428	276,211	74.8

DETAILED INFORMATION.

PRODUCTION BY STATES.

As shown by Table I, New York leads all States in number of companies, cords of wood used, and pounds of pulp produced. Of the total number of companies (164) producing pulp, New York has 60, or more than one-third; of wood used, New York takes over one-third of all and more than twice as much as her nearest competitor, Maine; of pulp produced New York furnishes one-third, and three times as much as Maine. New York's annual consumption of wood is more than 1,300,000 cords; Maine's about 500,000 cords. Wisconsin, New Hampshire, Pennsylvania, and Michigan follow in the order named. These six States consume the bulk of the wood and have 133 of the 164 companies. In annual capacity the Eastern mills far outrank those elsewhere, New Hampshire leading with an annual average capacity per mill of approximately 290,000 cords. Maine follows with more than 275,000 cords per mill.

Table V carries the State production further than Table I, and shows species and totals by processes.

TABLE V.—*Pulp production in 1905, by species, States, and processes.*

MECHANICAL PROCESS.

State.	Spruce.		Poplar.		Balsam.	Hemlock.	Pine.	Miscellaneous.
	Domestic.	Imported.	Domestic.	Imported.				
	Cords.	*Cords.*	*Cords.*	*Cords.*	*Cords.*	*Cords.*	*Cords.*	*Cords.*
New York	450,639	194,789	2,334	.....	4,610	3,230	1,396	50
Maine	113,518	13,066	1,883	.....	1,442	113	843	.....
Wisconsin	150,763	16,500	2,952	.....	850	.....	4,552	227
New Hampshire	8,769	.....	.....	.....	.....	.....	.....	.....
Pennsylvania	4,200	.....	.....	.....	.....	26,000	.....	.....
Michigan	6,077	100	450	2,800	65	500	741	.....
West Virginia	8,351	.....	.....	.....	.....	.....	.....	.....
Virginia	.....	.....	.....	.....	.....	.....	.....	4,500
Ohio	6,000	1,000	.....	.....	.....	1,000	500	.....
Minnesota	30,302	.....	.....	.....	.....	.....	.....	.....
Vermont	13,422	4,834	373	.....	3,642	.....	.....	.....
Massachusetts	2,000	.....	600	.....	200	.....	.....	.....
All other	.....	.....	.....	.....	.....	.....	6,400	.....
Total	794,260	230,289	8,592	2,800	10,801	30,843	14,432	4,777

TABLE V.—*Pulp production in 1905, by species, States, and processes*—Continued.

SULFITE PROCESS.

State.	Spruce.		Pine.	Hemlock.	Balsam.	Miscellaneous.
	Domestic.	Imported.				
	Cords.	*Cords.*	*Cords.*	*Cords.*	*Cords.*	*Cords.*
New York	321,508	200,335		26,161	17,557	
Maine	197,200	14,644				
Wisconsin	49,394			154,847	2,386	
New Hampshire	74,431	142,000		500	8,000	
Pennsylvania	7,815	11,048		64,692	18,000	20,000
Michigan	10,500	17,975		70,215		341
West Virginia	40,532			11,664		
Virginia	59,040					
Ohio				16,500		24,000
Minnesota	1,500					
Massachusetts	22,004	6,254				
All other	750		18,600			
Total	784,674	392,256	18,600	344,579	45,943	44,341

SODA PROCESS.

State.	Spruce.		Poplar.		Pine.	Cottonwood.	Miscellaneous.
	Domestic.	Imported.	Domestic.	Imported.			
	Cords.	*Cords.*	*Cords.*	*Cords.*	*Cords.*	*Cords.*	*Cords.*
New York	41,455		25,631	12,291			
Maine	28,517		123,081	7,500			
Wisconsin							
New Hampshire							
Pennsylvania			36,714		24,367		37,990
Michigan							
West Virginia			30,645				5,165
Virginia			26,000				
Ohio			3,000			2,000	
Minnesota							
Vermont							
Massachusetts			3,012	292			
All other	1,803		42,500			8,597	4,466
Total	71,775		290,583	20,083	24,367	10,597	47,621

GENERAL INFORMATION.

Miscellaneous information of general interest is given in Table VI. The table shows the average daily output of pulp for the mills of each State as reported by the manufacturers. A comparison of these figures with the total amount of pulp manufactured and the number of mills operating for the time given discloses the fact that they are uniformly too large. It is likely, therefore, that the figures submitted by the manufacturers represent more nearly the maximum daily capacity than the average daily output.

TABLE VI.—*General and detailed information of the pulpwood industry.*

State.	Number of companies reporting.	Average months operated.	Claimed average daily output.	Number of companies using the different processes.					Number of companies—								Average value per cord of wood at timber camps.	Estimated length of supply.
				Sulfite.	Soda.	Mechanical.	Sulfite and soda.	Sulfite and mechanical.	Receiving peeled wood.	Receiving rossed wood.	Using slabs.	Carrying on logging operations.	Importing wood from other States or from Canada.		Making both paper and pulp.			
													All.	Prt.				
		No.	*Pounds.*													*P.ct.*		*Yrs.*
New York	60	12	86,900	5	1	43	1	10	55	55	48	49	....	21	40	67	$6.25	19
Maine	18	12	120,900	8	2	5	....	3	14	13	15	14	....	2	12	67	5.88	15
Wisconsin	30	11	54,200	5	...	17	....	7	22	22	22	22	1	19	16	53	4.41	13
New Hampshire	6	12	119,900	3	...	3	....	....	7	7	6	6	....	2	4	67	5.38	28
Pennsylvania	11	12	79,800	2	6	....	....	1	10	10	10	10	1	6	11	100	4.62	15
Michigan	8	12	41,225	5	...	3	....	....	8	6	8	7	....	3	7	88	4.33	20
West Virginia	4	12	68,600	1	...	2	1	....	4	4	4	5	....	....	3	75	5.16	23
Virginia	3	12	101,900	1	1	....	....	1	3	3	3	3	1	1	3	100	5.50	15
Ohio	3	12	49,300	1	1	1	....	1	3	3	4	4	1	2	3	100	5.08	.....
Minnesota	3	12	54,300	...	...	3	....	....	3	3	3	3	....	....	3	100	3.83	.....
Vermont	7	11	24,600	...	...	7	....	....	7	7	6	7	....	2	4	57	5.50	30
Massachusetts	4	12	31,000	2	...	2	....	....	4	3	3	3	1	2	3	75	5.00	25
All others	7	10	46,000	1	3	....	....	3	4	5	6	6	....	....	7	100	4.25	30
Total	164	....	.....	34	14	86	2	26	144	141	138	139	5	60	116	.....	.....	.....
Average	....	11.7	69,125	...	...	....	....	....	....	....	....	....	....	....	....	70.7	5.01	21

The utilization of slabs for pulp appears to have become quite common, 138 establishments reporting their use. The percentage which slabs form of the total amount of wood, however, is small, since they rarely constitute over 10 per cent of the total amount of wood used by a single mill.

Of the 164 companies reporting, 139, or approximately 85 per cent, carry on logging operations, which may also be taken to indicate that they own or control timberland. Only five companies depend wholly upon other States or Canada for their supply.

The price of wood at the point of shipment—in other words f. o. b. cars or on the banks of a stream—was an item upon which there was surprising diversity among the firms reporting; the figures in a State often varying from $2 to $10 per cord. In the compilation extreme cases were disregarded, as it was evident that the price given would in some cases no more than cover the actual cost of cutting and driving or hauling, while on the other hand the maximum prices submitted evidently included transportation to the mill. Of the States named, the two Lake States, Minnesota and Wisconsin, are credited with the cheapest raw material, $3.83 and $4.41 per cord, respectively, while in New York the average price is $6.25 per cord. The average price per cord of all is $5.55.

Estimates of the length of time which the supply of timber will last were very consistent within States, and the consensus of opinion is to be found in the averages given in Table VI.

The extent to which the manufacture of paper is combined with the manufacture of pulp is demonstrated in the last section of the table, where it will be noted that the percentage of the mills making both paper and pulp is very high, and, in several instances, all the mills in a State make both.

One of the interesting features brought out by the returns is the sawmill waste and the different kinds of wood now being made into pulp. Among these were noted pitch, jack, and southern pines, maple, birch, beech, white fir, and some of the pines of the Pacific coast. Of sawmill waste, sawdust and veneer cores were mentioned. It is probable that other woods and waste materials may be used for pulp, and the Forest Service has established a laboratory to investigate these possibilities.

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